

Notice No.1

Rules and Regulations for the Construction and Classification of Ships for the Carriage of Liquefied Gases in Bulk, July 2020

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Please note that corrigenda amends to paragraphs, Tables and Figures are not shown in their entirety.

Issue date: December 2020

Amendments to	Effective date	IACS/IMO implementation (if applicable)
LR III.9	1 January 2021	NA
LR IV.3	1 January 2021	NA
LR IV.4	1 January 2021	NA

LR III

Classification, Class Notations and Descriptive Notes

■ LR III.9 Descriptive note – FSRU Ready

LR III.9.1 **FSRU Ready ().** This descriptive note may be assigned with an extension of one or more of the following associated characters shown in brackets which denote the aspects of design and construction, to the ship intended to operate for a period at a fixed location in regasification and gas discharge mode or gas receiving, processing, and storage mode (FSRU) in accordance with these Rules:

FSRU Ready (A). Approval in principle

FSRU Ready (S). Structural reinforcement

FSRU Ready (MOOR). Long term station-keeping capability of mooring system

■ LR III.910 Types of tank

LR III.910.1 These Rules include requirements for the carriage of cargo in containment systems incorporating integral, membrane, semi-membrane or independent tank types as detailed in Chapter 4.

■ LR IV.3 Required Information and Plans for Descriptive note FSRU Ready

LR IV.3.1 The following plans and documentation are to be submitted for each **FSRU Ready** descriptive note with applicable associated characters:

- (a) **FSRU Ready (A)**
 - (i) Design screening completed in accordance with ShipRight Procedure Risk Based Designs (RBD) requirements.
 - (ii) Risk assessment to demonstrate the elimination or mitigation of risk from new, novel or alternative designs.
 - (iii) Regasification system general arrangement. Plans showing the general arrangement of all areas where equipment, components and piping systems are located.
 - (iv) Regasification system process flow diagram.
 - (v) Hazardous area plan.
 - (vi) Other plans related to FSRU operation, as required by LR.
- (b) **FSRU Ready (S)**
 - (i) Hull girder strength calculations.
 - (ii) Local scantlings calculations.
 - (iii) Strength and fatigue analyses for cargo tank and/or cargo hold structures.
 - (iv) Sloshing analysis for supporting structures of membrane cargo containment system or independent type cargo tanks structures where necessary.
 - (v) Plans showing arrangement, materials and scantlings of on-deck and underdeck supporting structure of regasification plants and other major equipment.
 - (vi) Strength and fatigue analyses of on-deck and underdeck supporting structure of regasification plants and other major equipment.
 - (vii) Protection of hull structure against cryogenic leakage.
 - (viii) Other plans related to FSRU operation, as required by LR.
- (c) **FSRU Ready (MOOR)**
 - (i) Mooring arrangement.
 - (ii) Mooring load analysis.
 - (iii) Plans showing the supporting structures of mooring fittings.
 - (iv) Strength analysis of mooring fitting and its supporting structure.
 - (v) Other plans related to FSRU operation, as required by LR.

■ LR IV.4 Additional Design Requirements for Descriptive note FSRU Ready

LR IV.4.1 **FSRU Ready** is assigned with extension of one or more of the following associated characters shown in brackets, detailing aspects of design and construction that are in accordance with these Rules in force on the date of 'contract of construction'.

A Approval in principle

S Structural reinforcement

MOOR Long term station-keeping capability of mooring system

LR IV.4.2 For assignment of the characters **A**, **S** and **MOOR**, the design appraisal is to be carried out in accordance with these Rules. Following aspects are to be especially considered for intended regasification operation in the future.

(a) FSRU Ready (A)

- (i) Risk assessment is to be carried out as required by 1.1.10 to 1.1.11 and LR 1.1-04 to LR 1.1-05 of these Rules.
- (ii) Proposed location, space and arrangement feasibility for future regasification facility are to be examined for compliance with applicable requirements of these Rules.

(b) FSRU Ready (S)

- (i) The descriptive note is for FSRU operation at sheltered nearshore environments with breakwater facilities or any other topographical protection. It is assumed that FSRU can escape to a safe location as planned when the environmental threshold for the disconnection is exceeded. For FSRU operation mode at sheltered nearshore environments, 50% of the design load values defined in these Rules and associated ShipRight procedures for the ship operations in the North Atlantic environment may be used for the design loads for the FSRU mode. Otherwise, direct calculation of site-specific design load is to be carried out in accordance with *The Rules and Regulations for the Classification of Offshore Units, July 2020 Pt 10, Ch 2, 3, Dynamic load components*.
- (ii) Hull girder longitudinal strength is to be in accordance with the requirement of LR 3.13 of these Rules. The weight is to include future items such as regasification plant, equipment and piping systems, etc. Where the FSRU operational information such as weight distribution of future facilities, site environmental condition, berthing arrangement and operational profile are not known, design still water bending moment and shear force envelope may be assumed the same as LNG ship design values in sheltered water.
- (iii) Local scantlings are to be in accordance with the requirements of LR 3.14 to LR 3.26 of these Rules. The supporting structures of membrane cargo containment system and independent cargo tanks structures are to be designed for increased design vapour pressure proposed by designer. In general, increased design vapour pressure 0,07 MPa may be assumed for membrane LNG ships.
- (iv) Primary structures of cargo holds or cargo tanks are to be verified with the requirements of relevant ShipRight Structural Design Assessment (SDA) and ShipRight Fatigue Design Assessment (FDA) procedures. If it is considered necessary, verification of structural reinforcements is also to be carried out for the supporting structures of regasification plant and major equipment, such as a suction drum. For membrane LNG ships with conventional arrangement and scantlings, separate Fatigue Design Assessment for the FSRU mode operation is not required. Structural Design Assessment may be waived provided that the design loads for North Atlantic ship operation is dominant.
- (v) Sloshing analysis is to be carried out for unrestricted filling levels. For independent cargo tanks primarily constructed of plane surfaces, critical structures such as tripping brackets of horizontal stringers are to be examined for strength and fatigue performance against sloshing loads.
- (vi) The descriptive note is for hull structure and independent cargo tanks only. Requirements for membrane cargo containment systems are not covered by **FSRU Ready (S)**. If it is requested that membrane cargo containment systems and associated internal structure, equipment and pipework exposed to fluid motion such as pump tower be considered, separate assessments are to be carried out in accordance with 4.14.3 and LR 4.14-03 of these Rules and LR's *Guidance on the operation of membrane LNG ships to reduce the risk of damage due to sloshing*.

(c) FSRU Ready (MOOR)

- (i) Mooring arrangements are to comply with *The Rules and Regulations for the Classification of Offshore Units, July 2020, Pt 3, Ch 10, 16 Long-term nearshore positional mooring system* for jetty mooring system or equivalent, where applicable.
- (ii) *The Rules and Regulations for the Classification of Offshore Units, July 2020, Pt 3, Ch 10, 1 General* to *Pt 3, Ch 10, 15 Trials* are to be complied for the other types of mooring system.
- (iii) Fatigue assessment of mooring fitting and its supporting structure can be an exception to the mooring system assessment. Where the FSRU operational information is not known, the limiting environmental parameters for the FSRU operation should be proposed.

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